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ABSTRACT OF THE DISCLOSURE

There are provided a positioning-controlling apparatus with improved accuracy and durability and a positioning-controlling method, which are free from abnormal noises and pulsating velocity caused by changes in torque which occur while a subject is being moved after the completion of the subject's origin returning operation.

The rotary encoder (2) should detect the Z phase in advance before the subject (4) is returned to the origin which is the position of the Z phase detected by the linear encoder (5). The driving mode of the servo motor (1) is switched from rectangular waveform pulse driving to sine waveform pulse driving upon the detection of the Z phase by the rotary encoder (2). Thus, after the subject (4) has returned to the origin, the subject (4) is moved by always driving the servo motor (1) according to sine waveform pulses. Otherwise, such arrangement is also possible in which the subject's moving direction for returning to the origin is previously specified, and in which the detection of the ON state of the origin sensor (11), the detection of the Z phase by the rotary encoder (2), and the detection of the Z phase by the linear encoder (5) are done in this order, while the subject (4) is being moved in the above specified direction. Alternatively, the rotary encoder (2) may detect the CS phase instead of the Z phase.

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By this Amendment, independent claims 1 and 5 (withdrawn) are amended to more clearly define the relative movement capabilities of the scanning device and mount and to recite that a slice scan or a helical scan is produced.

Regarding independent claim 1, Sjölin fails to disclose (1) "at least a portion of the scanning device being linearly displaceable in a direction toward and away from an article held by the mount"; (2) "the scanning device and mount are relatively displaceable in a direction parallel to a rotary axis of the mount;" and (3) "the scanning device and mount are relatively displaceable in a direction parallel to the rotary axis of the mount, wherein, if the mount is rotated, a slice scan of the article is produced and, if the mount is rotated and the scanning device and mount are relatively displaced by movement in the direction parallel to the rotary axis, a helical scan of the article is produced".

Sjölin is directed to measurement of tooth preparations by projecting a line of light onto an object and imaging that line. Because parts of objects to be scanned cannot be imaged completely by using one axis of rotation as shadows may result that cannot be illuminated using only one rotational axis, Sjölin discloses use of a second rotational axis. Sjölin discloses two embodiments, a first embodiment with two rotational axes and one translational axis, and a second embodiment with two rotational axes and two translational axes.

In Fig. 5, cited by the Office Action, Sjölin discloses the second embodiment having a carrier 201, a holder 204, rotatable disk 207, slideable support member 217, an object 209, light source 213, and camera 215. Object 209 is mounted on slideable support member 217 which is mounted on rotatable disk 207, which is mounted on holder 204, and which is mounted on carrier 201. In operation, carrier 201 can translate along a first translation axis 203; holder 204 can rotate, in a limited fashion, about tilt axis 205; rotatable disk 207 can rotate about first rotation axis 111/211 (first rotational axis is identified by reference character

111 in Fig. 5 and identified by reference character 211 in the related disclosure); and slideable support member 217 can translate along sliding axis 219 (Fig. 5; page 7, line 24 - page 8, line 15).

Sjölin fails to disclose feature (1) of at least a portion of the scanning device being linearly displaceable in a direction toward and away from an article held by the mount because the scanning device of Sjölin, camera 215, is not able to be moved toward or away from holder 204.

Sjölin fails to disclose or suggest feature (2), that the scanning device and mount are relatively displaceable in a direction parallel to a rotary axis of the mount, because camera 215 and carrier 201 are not displaceable along rotational axes 111/211. The claimed term "along" would require that camera 215 and carrier 201 (or holder 204 or rotatable disk 207 or slideable support member 217) be able to move closer/farther in a direction parallel to first rotational axis 111/211. This cannot occur in Sjölin's device.

Sjölin fails to disclose feature (3) because Sjölin does not disclose or suggest that Sjölin's device is configured to helically scan and to scan in slices, the object 209.

For the foregoing reasons, Applicants request withdrawal of the rejection.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:JHB/wkb

Date: March 6, 2008

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